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Humans assess the emotional content of conspecific and dog vocalizations on similar acoustical bases

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Compared to other mammals, humans are extremely vocal. Using language frequently eases the expression of inner states, but there is an evolutionarily more conservative set of vocalizations, the non-verbal vocal bursts (or calls) that play an important role in human emotion expressions. We can draw homologies between some of these calls with mammalian vocalizations: e.g. based on its acoustics, the evolution of human laughter can be derived from pleasure vocalizations of the apes. Humans are also good at recognizing the emotional states of conspecifics based solely on these vocal bursts. Moreover, they can perform surprisingly well in assessing inner states of other species. Several studies showed, for example, that human listeners can attribute probable inner states to dog barks. Dogs are a good source of emotion expressing calls, due to their rich and variable repertoire and the fact that they have lived with humans for more than a thousand years. It is not known, however, whether human listeners use the same acoustic cues to assess emotional content in conspecific and non-conspecific vocalizations. Here, we aimed to compare how human listeners rated the emotional content of dog and human non-verbal vocalizations, and also to explore what acoustical parameters affected their responses. To test this, we compiled a pool of 100-100 various types of dog and human non-verbal vocalizations from diverse social contexts, and designed an online survey, in which every sound sample could be rated parallel along two dimensions: emotional valence (ranging from negative to positive) and emotional intensity (ranging from not arousal to maximal arousal). The sound samples were presented in random order for each subject (N=39). We calculated the mean of the valence and intensity scores for each sound sample. We also measured the average length of bursts within each sample (call length), the fundamental frequency (f0) and the harmonics-to-noise ratio (HNR). Comparisons of these acoustic measures showed that on average, dog vocalizations had shorter call lengths and were noisier, but their overall f0 did not differ from the human vocalizations. Valence ratings did not differ across species, but human vocalizations were rated less intense. Importantly, linear regressions revealed similar relationships for human and dog vocalizations between acoustic features and emotional ratings. Call length had a significant effect on valence: both dog and human sounds with shorter call lengths were rated as more positive. F0, in contrast, influenced the intensity scores mainly: both higher pitched human and dog sounds were rated more intense. We also found some species-specific relationships between acoustics and perceptual scores: dog vocalizations with a shorter call length or with a higher harmonics-to-noise ratio were rated less intense. In sum, acoustical parameters affected humans' emotional ratings independently from the source species of these vocal expressions, despite the acoustical and emotional differences between human and dog vocalizations. These findings suggest that humans utilize the same mental mechanisms for recognizing conspecific and heterospecific vocal emotions.